



Contents lists available at ScienceDirect

Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: www.elsevier.com/locate/dsx



Original Article

Descriptive epidemiology of metabolic syndrome among obese adolescent population

Sharmin Mahbuba^{a,*}, Fauzia Mohsin^a, Farhana Rahat^b, Jebun Nahar^a, Tahmina Begum^a, Nazmun Nahar^a

^aBIRDEM General Hospital, Dhaka, Bangladesh

^bShishu Shashthyo Foundation Hospital and Institute of Child Health, Dhaka, Bangladesh

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Metabolic syndrome
Descriptive epidemiology
Obese adolescent

ABSTRACT

Aims: The study was done to assess the magnitude of problems of metabolic syndrome among obese adolescents.

Materials and method: It was a cross-sectional study done from January 2013 to June 2014 in paediatric endocrine outpatient department in BIRDEM General Hospital, Dhaka, Bangladesh. Total 172 adolescents having exogenous obesity aged 10–18 years were included. Impaired fasting glucose (IFG), impaired glucose tolerance (IGT) and type 2 diabetes mellitus (DM) were defined as per WHO criteria. The adolescents having Body Mass Index (BMI) ≥ 95 th centile were classified as obese. Waist circumference was measured at the level midway between the lower rib margin & the iliac crest, at the level of umbilicus with the person breathing out gently in centimeter. Hip circumference was measured at the maximum width over the buttocks at the level of the greater trochanters in centimeter.

Result: Among 172 obese adolescents, metabolic syndrome was found in 66 patients (38.4%). The commonest metabolic abnormality among those having metabolic syndrome was low HDL level (77.3%) followed by high triglyceride level (71.2%). Glucose intolerance (IFG and/or IGT) was found in 16.7%, Type 2 DM in 10.6%, systolic hypertension in 10.7% and diastolic hypertension in 12.1%. Triglyceride ($p = 0.042$) and Cholesterol level ($p = 0.016$) were significantly higher and HDL-cholesterol level ($p = 0.000$) was significantly lower among obese adolescents having metabolic syndrome. Less physical activity ($p = 0.04$) was significantly related to the development of metabolic syndrome. On logistic regression analysis male sex, family history of obesity and low HDL-cholesterol correlated to metabolic syndrome.

Conclusion: The High rate of metabolic syndrome among obese adolescents is alarming.

© 2018 Diabetes India. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Obesity has become a concern for impending global epidemic and it is increasing in both industrialized and developing countries. By 2020, it is estimated that the global prevalence of childhood obesity will reach approximately 60 million [1]. Prevalence of obesity has increased globally and the most change, from 11% to 15%, occurred among 6 to 19 years of age group [2]. The prevalence of obesity in affluent school children in India was found to be 6% in Chennai and 7.4% in Delhi [3,4]. The prevalence of obesity was found 7.6% in 2002 [5] and that was 17.9% in 2006 among children in Dhaka city and that of overweight was 23.6% among them [6]. The rate of overweight and obesity is alarming

among school aged children in Bangladesh [7]. Previous two studies among Bangladeshi school children of 6 to 15 years aged children found the prevalence of obesity and overweight was 3.5% and 9.7% respectively [8]. Recent survey by Bangladesh Bureau of statistics (BBS) and UNICEF reported 1.4% prevalence of overweight among children less than 5 years of age [9]. Obesity plays a central role in the insulin resistance syndrome and many other comorbidities. The pathophysiology of the development of glucose intolerance and dyslipidaemia is complex. Insulin resistance play the central role and when type 2 diabetes mellitus is clinically present, both insulin action and insulin secretion are impaired [10]. Hyperinsulinemia is known to enhance hepatic very low density lipoprotein synthesis and thus may directly contribute to dyslipidaemia. It also increases renal sodium retention and increased sympathetic nervous system activity leading to essential hypertension [11].

* Corresponding author at: Department of Paediatrics, BIRDEM General Hospital, Dhaka, Bangladesh.

The metabolic syndrome in adults is defined as a cluster of cardiovascular and diabetes risk factors including abdominal obesity, dyslipidaemia, glucose intolerance and hypertension [12]. There is no unified definition of metabolic syndrome in children and adolescents. Yet there are a range of published definitions of metabolic syndrome in Paediatrics [13–16]. The global emergence of metabolic syndrome in youth parallels the increasing epidemic of childhood and adolescent obesity. Different studies have reported the prevalence of metabolic syndrome 28.7% to 37.5% among children and adolescents with obesity [15–17]. It is postulated that Bangladeshis and Indians are more likely to develop metabolic syndrome compared to western countries as there is increased tendency of developing central obesity among this population [18]. In a previous study in Bangladesh, the prevalence of metabolic syndrome among obese children and adolescents were 36.6% with greater number amongst girls [19]. Another one reported 17% IGT, 2% DM and 26% high total cholesterol among obese children and adolescents [20]. Limited data is available from our country about this nutritional disorder and hence this study was done to find out the magnitude of problem of metabolic syndrome among obese adolescent population.

2. Materials and methods

A cross sectional study was conducted from January 2013 to June 2014 among obese adolescents attending paediatric endocrine outpatient department of BIRDEM. Adolescents aged 10–19 years with exogenous obesity were included in this study. Those having any dysmorphism, chromosomal abnormality or other endocrine problem were excluded. History was obtained from all the subjects and physical examination was performed. Anthropometric measurements were measured. Weight was measured using a bathroom scale and standing height was measured using stadiometer. The waist circumference was measured at the level midway between the lower rib margin & the iliac crest, at the umbilicus with the person breathing out gently in centimeter. Hip circumference was measured at the maximum width over the buttocks at the level of the greater trochanters in centimeter. The ratio of waist and hip circumference; ratio of waist circumference and height and ratio of waist circumference and arm span were measured. Triceps skin fold thickness was also measured. Blood pressure (BP) was measured at supine position using appropriate sized cuff encircling at least 2/3rd of upper arm. The Body Mass Index (BMI) was calculated as weight in kilogram (Kg) divided by square of the height in meter. Obesity was defined as BMI \geq 95th percentile for age and sex using CDC growth chart [21].

On enrollment children underwent two samples of oral glucose tolerance test (OGTT). Patients were kept on unrestricted carbohydrate diet for at least three consecutive days prior to the test and kept fasting for 8–12 hours on the night before doing the test. Blood was collected at “0” minute for estimation of glucose, lipid profile and other relevant investigations. Then anhydrous glucose was given in the amount of 1.75 gm/kg body weight (maximum 75 gm) dissolved in water for OGTT. The second sample of blood glucose was collected at “120” minute. Estimation of blood glucose and lipid profile was done by enzymatic colorimetric method using multichannel auto analyzer. Hormone analysis was done by competitive analog immune assay in multichannel auto analyzer. Diabetes mellitus, Impaired glucose tolerance, Impaired fasting glucose and normal glycaemic status were defined as per World Health Organization (WHO) criteria [22]. The normal value of fasting plasma glucose is <6.1 mmol/l and when it was ≥ 6.1 – <7.0 mmol/l, it was termed as IFG. Diabetes mellitus was diagnosed when venous plasma glucose level at ‘0’ minute was ≥ 7.0 mmol/L and that at ‘120’ minute was ≥ 11.1 mmol/L.

According to WHO the normal value of plasma glucose at 120 minute is <7.8 mmol/l and when it was ≥ 7.8 – <11.1 mmol/L, it was termed as IGT [22]. Hypertension was defined as BP \geq 95th percentile for age and sex [23]. A total cholesterol (Chol) ≥ 200 mg/dl, Triglyceride (TG) ≥ 150 mg/dl, low-density lipoprotein cholesterol (LDL-C) ≥ 130 mg/dl, high-density lipoprotein cholesterol (HDL-C) <40 mg/dl were considered as abnormal [24,25]. Metabolic syndrome was identified if 3 or more of following criteria were met- a) BMI \geq 95th percentile for age and sex b) High triglyceride level c) Low HDL cholesterol d) Systolic or diastolic pressure >95 th percentile for age and sex and e) IGT/DM [13]. Data were analyzed using SPSS software (version 17). Student ‘t’ test and Chi-Square test was performed when applicable. P value of <0.05 was considered significant. Descriptive statistics were reported as mean \pm SD.

3. Results

A total of 172 adolescents presented with obesity. Majorities (84.9%) of the subjects were in age group of 10–14 years with male to female ratio of 2.8:1.

The mean level of fasting blood glucose was 4.9 ± 0.9 mmol/l and 2 h after glucose intake was 6.7 ± 1.6 mmol/l. Mean TG level was 143.1 ± 73.7 mg/dl; mean cholesterol level was 182.6 ± 32.2 mg/dl; mean LDL level was 113.8 ± 36.3 mg/dl and mean HDL level was 43.5 ± 16.1 mg/dl. Baseline biochemical parameters of obese adolescents are shown in Table 1.

Among them the commonest metabolic abnormality was high triglyceride level. Seventeen percent (16.9%) of them developed IGT; 2.9% of them developed IFG; 6.4% of them developed type 2 diabetes mellitus; 11% of them developed systolic hypertension and 15.1% developed diastolic hypertension.

Among the study population, metabolic syndrome was found in 38.4% having male to female ratio of 2:1. Most of them (60.6%) had monthly income between taka five thousand and twenty thousand and came from urban area (59.1%).

Among the 66 obese adolescents with metabolic syndrome, the commonest metabolic abnormality was low HDL level (77.3%) followed by high triglyceride level in 71.2%. Glucose intolerance (IFG and/or IGT) was found in 16.7%, Type 2 DM in 10.6%, systolic hypertension in 10.7% and diastolic hypertension in 12.1%. Metabolic abnormalities are shown in Table 2.

When metabolic profile was compared, TG level was significantly higher ($p=0.042$) and HDL level was significantly lower ($p=0.000$) among obese adolescents having metabolic syndrome compared to the subjects not having metabolic syndrome. Similarly Cholesterol level was significantly higher ($p=0.016$) among those having metabolic syndrome. Comparison of biochemical parameters among obese adolescents having metabolic syndrome and those not having metabolic syndrome is shown in Table 3.

Table 4 shows that there was no significant difference in anthropometric measurements between these groups.

While comparing the risk factors between those having metabolic syndrome and those not having; less physical activity

Table 1
Biochemical parameters of the respondents (n = 172).

Biochemical parameters	Mean \pm SD
Fasting blood glucose (FBG) in mmol/l	4.9 (± 0.9)
2 h after glucose (2HAG) in mmol/l	6.7 (± 1.6)
Triglyceride (TG) in mg/dl	143.1 (± 73.7)
Cholesterol (Chol) in mg/dl	182.6 (± 32.2)
low density lipoprotein (LDL) in mg/dl	113.8 (± 36.3)
High density lipoprotein (HDL) in mg/dl	43.5 (± 16.1)

Download English Version:

<https://daneshyari.com/en/article/8658775>

Download Persian Version:

<https://daneshyari.com/article/8658775>

[Daneshyari.com](https://daneshyari.com)